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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/818,906	03/28/2001	Keiichiro Wakamiya	50090-290	2402

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EXAMINER
PAREKH, NITIN

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 11/20/2002

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.	Applicant(s)
09/818,906	Wakamiya et al
Examiner	**Art Unit**
Nitin Parekh	2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *Sep 12, 2002*.

2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above, claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-13* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are a) ☐ accepted or b) ☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☒ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a) ☒ All b) ☐ Some* c) ☐ None of:

1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

*See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s). 4
4) ☐ Interview Summary (PTO-413) Paper No(s). _____
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 1, 7, dependent claims 2-6 and 8-13 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. .

Claims 1 and 7, lines 5 cite: "a plurality of connecting conductors.....
.....penetrating the protective insulating layer beyond the outside surface of the protective insulating layer."

However, the description in the specification (pp. 4-7) and Fig. 1-2B show the stacked/laminated protective insulating layer (5/3/7 in Fig. 1-2B) covering the plurality of connecting conductors (10/4 in Fig. 1-2B) and the connecting conductors being flush/coplanar with the outside surface of the protective insulating layer. The description in the specification (page 5, line 25-27) cites "the protective dielectric layer

3, the sealing resin 5 and the coating layer 7 constitute a protective insulating layer in a stacked fashion.....".

The subject matter does not properly describe how the connecting conductors penetrate beyond the outside surface of the protective insulating layer.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (APA) in view of Ohtsuka et al (US Pat. 5952718) and Omoya et al (US Pat. 5641996).

Regarding claim 7, the APA discloses a semiconductor device comprising:

- a semiconductor chip (1 in Fig. 3)

- a protective insulating layers covering the surface of the chip (3/7/5 in Fig. 3) , and

- a connecting conductor/post (4 in Fig. 3) connected to the surface of the chip and penetrating the protective insulating layer to the outside surface of the insulating layers

and connecting an external terminal

(Fig. 3; specification- pp. 1 and 2).

The APA fails to specify using the connecting conductor formed of a plurality of layers formed of different material where at least one of the layers is a stress absorbing layer having lower hardness than the other layer.

Ohtsuka et al teach using a connecting conductor formed of a plurality of layers (35/36/38 in Fig. 3 and 5a-c) which are of different material such as nickel, gold, palladium, indium, etc (Col. 5, line 15- Col. 6, line 10) where at least one of the layers is made of stress absorbing material such as gold having lower hardness than the other layer such as nickel (Col. 5, line 50; Col. 6, line 10).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to incorporate the connecting conductor made of a plurality of layers formed of different material where at least one of the layers is a stress absorbing layer having lower hardness than the other layer so that the mechanical stress can be reduced and reliability of interconnection can be improved using Ohtsuka et al's electrode structure in the APA.

Regarding claim 8, the claim elements have been addressed in the rejection as explained above for claim 7.

Regarding claim 9, the APA fails to specify using the connecting conductor formed of an anisotropic conductive material containing metal particles.

Omoya et al teach using conventional anisotropic conductive adhesive material containing metal particles (13 in Fig. 11) for electrode interconnection (Col. 2, line 1-13).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to use the connecting conductor formed of an anisotropic conductive material containing metal particles so that the mechanical stress can be reduced and reliability of interconnection can be improved using Omoya et al and Ohtsuka et al's electrode structure in the APA.

Regarding claim 10, the claim elements have been addressed in the rejection as explained above for claim 9.

5. Claims 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over the admitted prior art (APA) in view of Ohtsuka et al (US Pat. 5952718), Omoya et al (US Pat. 5641996) and further in view of Matsumoto et al (US Pat. 5866920) and Chakravorty (US Pat. 6181569).

Regarding claim 11, as explained above, the APA in view of Ohtsuka et al and Omoya et al teach using a connecting conductor formed of a plurality of layers fails to specify forming a plurality of conducting layers by means of stacking in a staggered manner and the layers being of substantially identical or different diameter.

Matsumoto et al teach forming a conventional multilayered structure comprising connecting conductors including wiring conductors and electrode plugs (51/52, 61/62, etc. in Fig. 3) where the plurality of conducting layers are stacked in a staggered manner (Fig. 3 and 7; Col. 1, line 30). Matsumoto et al further teach forming the plurality of conducting layers comprising those of substantially identical or different diameter/dimension (51, 61, etc. in Fig. 3).

Chakravorty teaches using a plurality of conducting layers (310, 311, etc in Fig. 8C/d) having different diameter/dimension in each insulating layer (308/312 in Fig. 8c/d) where the conducting layers connect the electrode pads to an external terminal.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time invention was made to form a plurality of conducting layers by means of stacking in a staggered manner and the layers being of substantially identical or different diameter so that the mechanical stress can be reduced and bonding strength can be improved using Matsumoto et al and Chakravorty's structures in the APA in view of Omoya et al and Ohtsuka et al.

Regarding claims 12 and 13, the claim elements have been addressed in the rejection as explained above for claim 11.

Response to Arguments

6. Applicant's arguments filed on 09-12-02 have been fully considered but they are not persuasive.

A. Applicant contends that the protective insulating layer being disclosed in the specification (page 4 and Fig. 1-2B) is referenced as layer 3 and not layer 5.

However, as explained above, the description in the specification (page 5, line 25-27 and page 7, line 4-7) cites "the protective dielectric layer 3, the sealing resin 5 and the coating layer 7 constitute a protective insulating layer in a stacked fashion. Therefore, the connecting conductors do not penetrate beyond the outside surface of the protective insulating layer as recited in the independent claims but flush with the outside surface of the protective insulating layer.

Conclusion

7. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Papers related to this application may be submitted directly to Art Unit 2811 by facsimile transmission. Papers should be faxed to Art Unit via Technology Center 2800 fax center located in Crystal Plaza 4, room 4C23. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989).

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nitin Parekh whose telephone number in (703) 305-3410. The examiner can be normally reached on Monday-Friday from 08:30 am-5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas, can be reached on (703) 308-2772. The fax number for the organization where this application or proceeding is assigned is (703) 308-7722 or 7724.

Nitin Parekh

11-14-02

Tom Thomas

TOM THOMAS
SUPERVISORY PATENT EXAMINER
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